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COMPLETENESS AND RELIABILITY OF BIRTH AND DEATH NOTIFICATIONS IN KUWAIT

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FOREWORD

The research reported in this paper was completed prior to the August 1990 invasion of Kuwait and reflects the situation existing at that time. The authors remind us that a careful and systematic review of the quality of reporting of vital events is essential for the most effective use of vital records and vital statistics for medical and public health research, planning, and program evaluation. The authors identify some reasons for the incomplete and inaccurate reporting of some items on the birth and death notification forms, and offer some recommendations for improvement.

Although many countries still face serious problems in attaining complete reporting of vital events, they must nevertheless pay attention to improving the quality of reporting. In this way the civil registration and vital statistics systems will be able to provide data users with reliable information which can be effectively used in a variety of programs, even before complete coverage of vital events is accomplished.

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COMPLETENESS AND RELIABILITY OF BIRTH AND DEATH
NOTIFICATIONS IN KUWAIT

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Completeness and accurate reporting of vital events is essential for gauging the trends in fertility and mortality in a country. Furthermore, vital events registration constitutes a potentially rich source for analyzing the risk factors in mortality, assuming that the quality of the records is good in terms of coverage as well as reliability. For the last 10-15 years, reports on the coverage and reliability of vital registration data in Kuwait have given it a satisfactory rating, meaning that the counting of events is more than 90% complete (Hill 1975; ECWA 1980; Al-Zein et al. 1982). Despite the relatively complete coverage of vital events, there is still a high level of missing data for some items on the birth and death notification.

The major objectives of this paper are: (1) to assess the completeness of the items reported on the birth and death notifications, and (2) to estimate the reliability of certain items of the birth notification by comparing those with matching information obtained for the respective birth in a household survey of mothers. By way of background, a brief discussion of the views on completeness of coverage of births and deaths is presented before the results of this study are reported. Finally, some suggestions for improvement are made in the light of observations that were carried out in one general hospital.

DATA

Three data sources are used for this study. First, the annual reports published by the Division of Vital and Health Statistics (DV&HS), Ministry of Public Health, which provide information on the amount of missing data on selected items of the birth and death notifications. The trend in completeness of items is shown on the basis of these data.

The second source is the unpublished information on missing data for the year 1988 from the DV&HS. A discussion of the differences in completeness of information across hospitals is based on these data. The events analyzed through this source are live births, deaths, and foetal deaths (or still births).

The third source consists of a household interview with a sample of mothers of recently registered births. A comparison of information given by the mother is made with that reported on the birth notification to arrive at estimates of reliability for various items. The mother of the infant was interviewed in May 1989 about six months after the birth as part of a study designed to ascertain the proximate determinants of infant mortality in Kuwait (Shah and Shah 1989). Surviving infants were used as controls for infants who had died during November, 1988.

In addition to the above quantitative data sources, the first author with the help of an Arabic assistant spent 4 days observing the procedure used in one general hospital for filling out the birth and death notifications. Our suggestions in the final section are based largely on these observations.

A REVIEW OF THE COMPLETENESS OF COVERAGE

A law requiring the compulsory registration of births and deaths was passed in 1964, three years after Kuwait gained independence, even though registration of births and deaths had been required as early as 1952 (Hill 1975). On the basis of an extensive evaluation using direct and indirect estimates, Hill concluded in 1975 that "...by 1970 birth registration was virtually

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complete and death registration almost complete..." (Hill 1975: 537). Similarly, an ECWA report on Kuwait concluded in 1980 that "the completeness of this (birth and death) registration is relatively high and the vital rates obtained are of an acceptable quality" (ECWA 1980: 7-4). Finally, a local publication quoting the United Nations stated that "the statistical office of the United Nations has given the highest rating 'C' (relatively complete) to vital registration data for Kuwait" (El-Zein et al. 1982). It may be noted, however, that the United Nations obtains its information from the country itself.

The process of registering births and deaths in Kuwait may be briefly described as follows. A notification form consisting of five self carbonized copies is filled out in the hospital, or clinic. The still birth notification contains only 4 copies. Each death notification is signed by the certifying physician. Each birth notification may be signed by the physician or another health attendant.

The first copy of the form is sent directly to the Central Registration Office that issues the birth (or death) certificate. The second copy is sent to the Authority for Civil Information which adds the birth to the population, and issues a civil identification card; or deletes a person from the population in case of death and cancels the civil identification card. A copy of the still birth notification is not sent to the Authority for Civil Information since there is no need to add such a birth to the population register. The third copy is sent to the Division for Vital and Health Statistics which compiles, tabulates and publishes the vital registration data. The fourth copy is given to the relatives of a newborn or the deceased who are required to take this copy to the Central Registration Department for the issuance of a certificate. The fifth copy is kept in the hospital or clinic. After five years, the old notifications in the hospital are destroyed. At the Central Registration Office, the notifications are preserved on microfiche.

A brief description of the infrastructure within which the birth and death registration is occurring would be useful for understanding why it has been possible for Kuwait to succeed so effectively in this endeavor. In 1989, almost 99% of all births occurred in hospitals or delivery centers all of which are well equipped to handle registration (DV&HS 1989). The birth certificate is required for a number of essential services such as school admission, obtaining a civil ID card that is required by law, for Kuwaiti nationals to join military service, and for newborn babies to receive vaccination. Every non-Kuwaiti birth requires a certificate in order to get a residence permit; about 72% of the population of Kuwait is non-Kuwaiti (CIA 1989).

Concerning deaths, about 65% of all deaths and 89% of infant deaths occurred in the hospital in 1989. Furthermore, 99% of all registered stillbirths occurred in the hospital (DV&HS 1989). Again, the death certificate is required for many legal procedures, such as taking a dead body out of Kuwait, for burial in Kuwait, or to claim inheritance. In case of infant deaths it may be noted that the percentage of neonatal deaths among all infant deaths was about 70 in 1989 (DV&HS 1989), which increases the probability of a hospital death and subsequent registration.

In addition to the factors mentioned above, the socioeconomic structure of the country has developed in a way that is conducive to a high level of compliance with the registration requirement. More than 95% of the population of Kuwait resides in urban areas. The access to health services is free and quantitatively of a fairly high level--with 695 persons per doctor and 223 persons per nurse in 1989 (DV&HS 1989). The percentage of literate females aged 10 and over had increased to about 80 by July 1989 (CIA 1989). All of the above create an environment that supports the registration of events.

However, the counting of an event does not necessarily imply that all the information that is supposed to be collected for an event is actually gathered, as documented in the next section.

RESULTS

TRENDS IN COMPLETENESS OF REPORTING OF INDIVIDUAL ITEMS

Published data are available on the completeness of reporting for only a few items, as shown in Table 1 for the period 1975 to 1988. An analysis of the data enables the following major conclusions. First, the trend in completeness of reporting has not necessarily improved with the passage of time. In the case of a few items, for instance the educational level of the deceased, completeness has in fact declined over time. Second, the quality (as judged by completeness) of the birth notification is better than the death notification. For example, in 1988 information on education was missing for almost 56% of the deceased on the death notification compared with 14% for the

fathers and 10% for the mothers on the birth certificate. Finally, the non-reporting appears to be an especially acute problem in the case of foetal deaths. For example, in 1988 birth order was not reported in for 46% of the foetal deaths compared with only 5% for live births.

COMPLETENESS OF REPORTING OF ITEMS IN 1988: BIRTHS

Excluding the names, date and time of birth, the birth notification in Kuwait contains 38 items. Analysis of unpublished data from the DV&HS indicates that information on only 12 of these 38 items was more than 99% complete (Table 2). Of those 26 items where information was incomplete, we found that half of the items had less than 10% missing information while the other half had 10% or more missing data.

Selecting those 13 items of the birth certificate for which 10% or more of the information was missing, we found that the items for which non-reporting was highest pertained to medical and delivery complications, and the number of prenatal visits. For the latter variable, information was missing in about half of all birth notifications (Table 3). A comparison of the government hospitals (where 75% of all births occur) indicates that the quality of birth notifications in the latter is decidedly and markedly superior. In case of private hospitals, for only 5 of the birth notification items was the data missing in ten percent or more of the records (Table 3). Data quality of birth notifications in maternal and child health (MCH) centers was better than in government hospitals but worse than in private hospitals. Finally, the number of prenatal visits was the item that had the highest percentage of non-reporting in all three sources.

In 1988, three-fourths of all births took place in the four government hospitals, shown in Table 4. A striking difference exists in the quality of data across these hospitals. Farwaniya Hospital had the best record with only one item that had a more than 10% non-reporting rate, namely number of prenatal visits. Maternity Hospital which carries the largest delivery load (41% of all deliveries in government hospitals), had exceptionally high levels of missing data for the items related to pregnancy and delivery complications. For several items, more than 70% of the information was missing in this hospital. It is also worth noting that information on the number of prenatal visits was not reported in 86% of the birth notifications in Maternity Hospital.

Next to the Maternity Hospital, Jahra Hospital had the highest percentage of missing information on most items (Table 4). Two items on which Jahra stands out as an exception are the education of mother and father. Unlike the other three hospitals that had less than 10% non-reporting on these variables, information on the father's and mother's education was missing in more than 60% of the notifications in Jahra Hospital. Although in comparison with the other health regions, Jahra has the lowest literacy level; a low level of education in the region does not in any way explain the high level of missing information for this item.

COMPLETENESS IN 1988: DEATHS

Excluding the names, the death notification contains 24 items. Information on 8 items was more than 99% complete, while for 13 items information was not reported in more than 10% of the notifications (Table 2). As shown in Table 5, the percentage of missing data on the death notification ranged from about 20% for "district of residence" to 94% for "age of father" (of the deceased). Information on the socioeconomic characteristics of the deceased were not reported on more than 40% of the death notifications. The items that had the highest level of non-reporting pertained to the characteristics of the deceased person's parents. Finally, it may be emphasized that cause of death was reported completely in all the death notifications.

Quality of death notifications was best in the case of deaths occurring in private hospitals, and worst for deaths that occurred at a place other than a hospital. In 1988, a sizable percentage of deaths (35%) occurred outside a hospital. About 62% of the deaths occurred in a government hospital, and only 3% in a private hospital (last row, Table 5).

COMPLETENESS IN 1988: FOETAL DEATHS

Excluding names and date of death, the foetal death certificate has 37 items. Data on completeness of reporting were available for 26 of these items listed in Tables 2 and 6. Of the 26 items analyzed, for 16 items more than 10% of the information was missing. (Table 6). Fifty percent or more of the information was missing on 8 items. As in the case of birth notifications, the item that had the highest percentage of missing data was the number of prenatal visits. Information was more completely reported on the mother's occupation and attendant at birth. However, the education

of both parents was not recorded in more than half of all notifications. When data from government hospitals is compared with that from private hospitals, the superior quality of the latter is again evident.

RELIABILITY OF DATA

In addition to the completeness of information on the notification forms, another important dimension of data quality is the accuracy of information reported on these forms. One way of judging the accuracy is to compare the information on the notification with an independent source. This was done through a comparison of selected items on the birth notification with information collected from the mother in a household interview. The results are shown in Table 7. The total number of cases on which the comparison could be made was 83. However, the actual comparisons fell short of this number because of the missing information in the notification. When the information was available in both sources, cross tabulations using similar categories suggested a high level of matching between the two sources.

For example, the number of stillbirths was reported to be the same in both sources in about 96% of the cases, while the reports about the mother's work were consistent in 90% of the cases. Age of the mother was reported consistently in more than 80% of the cases. The Kappa values for a majority of the variables were above 0.5 which indicates a fair level of consistency in the two sources (Fleiss 1981). The lowest consistency was present for the number of prenatal visits.

A comparison of the two data sources indicates that in case of abortions and the deaths of live born children, in a substantially large number of cases the mother reported the event. Whereas, no such event was recorded in the notification as shown below:

	<u>% reporting an event</u>	
	<u>Mother's survey</u>	<u>Birth notification</u>
Abortions	33.8	11.8
Deaths of live born children	39.7	8.8

Despite the impressive degree of reliability revealed by Table 7, two points of caution are necessary. First, grouping of data that was done for a few of the variables may hide some discordance between the two data sources, thus exaggerating the level of reliability. For example, age of mother was regrouped into 5 categories. Such regrouping may have increased the level of reliability. The three variables that were regrouped into broad categories were age of mother, birthweight of baby, and the number of prenatal visits. For the remaining variables, a comparison was made between the detailed categories.

The second qualification concerns the timing of the interview relative to the birth notification. As mentioned above, the interview was conducted about six months after the majority of the birth certificates had been filled out. Thus, in the case of a few variables (e.g., the mother's work status, or the number of abortions) genuine changes in status may have occurred, and might result in inconsistent results. However, there is good reason to believe that most variables (e.g. education, or number of live born children) would have remained constant over the six month period after which the interview was conducted.

Despite the qualifications mentioned above, the high degree of consistency between the two data sources speaks well for the quality of the notifications, provided the information is not missed by the data collection system.

DISCUSSION

An analysis of the completeness of data recorded on the birth and death notifications in 1988 in Kuwait reveals the following. The information in the birth notification is relatively more complete than in the death notification. In case of live births, information was missing in more than 10% of the notifications for 13 of the 38 items analyzed. In case of deaths, the corresponding proportion was 13 out of 24 items. Reported foetal deaths were extremely incomplete, and half of the 26 items analyzed had non-reporting rates of more than 20%.

In terms of reliability of the reported data, comparison of the birth notification with the mother's interview found that the degree of consistency for most variables was significantly high. This implies that if data were completely reported in the birth certificate, their quality would be of an acceptable level. However, data on some of the most crucial medical aspects relating to a birth is missing in about one-third of the records. For example, data on the method of delivery (normal, forceps, cesarian section, etc.) was missing in 32% of the birth notifications. Similarly, data on complications during pregnancy and delivery were missing in more than one-third of the notifications. The variable that had the highest non-response rate was the number of prenatal visits.

Possible reasons for the high level of missing data and a few suggestions for improving the current situation are given below, first for birth and then for death notifications.

BIRTH NOTIFICATION

A major reason for the incomplete reporting of the medical variables may be the fact that these items were included in the birth notification only at the beginning of 1987, and the medical record clerk who fill out the birth notification do not as yet appreciate the significance of this information. Furthermore, no system for an ongoing evaluation of data quality exists. Analyses like the present one are therefore necessary in order to call attention to this problem. Our observation of the procedure of data collection in one hospital showed that a majority of the birth notifications were filled out on the basis of information given by the father (or another relative, usually male) who came to pick up the notification. A copy of the notification is required for the issuance of the birth certificate. However, information by the father may not be as reliable as that provided by the mother, especially in terms of the past obstetric history, and length of gestation. Data on length of gestation was missing in one-fourth of the cases, perhaps because the husband does not know this or is not asked, as found during our observation.

A useful, alternative source of information already exists within the hospital which could help improve data completeness. A form is filled out in the labor room by the labor room clerk containing all the information on the birth certificate. The items of information that are missing in the birth notification are usually present in the hospital file of the patient, as found by the second author in a research study (Al-Sayed, 1985). However, it cannot be said with confidence that the form that is required to be filled in the labor room is always completed. The clerk usually does note the relevant information about the medical aspects of birth in a register kept in the labor room. She shares this register with the birth notification clerks who are expected to copy the information onto the notification form.

The identification, socioeconomic, and obstetric history information on this form is provided by the mother when she is in the ward, while the medical information is supposed to be collected from the hospital file in consultation with the nurse. As per instructions issued by the Ministry of Public Health, the clerk at the registration window is supposed to have a copy of this form with him/her while filling out the notification (MoPH 1986). The clerk is supposed to copy the information on medical aspects of the birth (about which the husband has no knowledge) from this internal form on to the birth notification.

In reality, however, this form is not being used by the notification clerks at all. During our observation, we found that the clerk was sometimes imputing a value on the basis of her experience. For example, she filled out the number of prenatal visits as 7 without asking the husband. The clerk assumed that if a woman had gone for prenatal care, she went about 7 times. Another assumption that the clerk made pertained to whether the delivery was normal or not. If it was, she then assumed that there were no complications during pregnancy or delivery, and filled out the information accordingly. Finally, the clerk assumed on the basis of a normal delivery and birthweight of the baby (3000+ kg.) that the length of gestation was 40 weeks. Thus, in the above situation, the data would be reported on the notification, but they might represent the clerk's "guess" rather than the actual picture.

In the hospital that we observed, with the exception of variables relating to medical aspects of birth, number of prenatal visits, and length of gestation, the clerk almost always asked the husband before filling out an item of the birth notification. The situation may be different in other hospitals, and warrants careful investigation. The practice of imputing values to certain variables on the basis of the notification clerk's experience may be present in clerks of other hospitals as well, and would require corrective action.

The extremely high level of non-reporting for medical items at the Maternity Hospital is a cause for concern. This hospital accommodates, as mentioned earlier, about 41% of all deliveries in the government hospitals, and is, therefore, especially important. The data on socioeconomic variables (e.g., education and occupation of parents) was quite completely reported in the Maternity Hospital as was the obstetric history. An active use of the internal form to fill out the medical aspects, gestational age and prenatal visits is a priority. Furthermore, the internal form should also be used to validate the information provided by the husband or another relative at the birth notification window. This may help in further improvement in the reliability of information in the birth notification.

Lack of completeness of data on the birth and death notification is a problem that is not unique to Kuwait. In a recent study in England, for instance, it was reported that data on certain items (e.g., 1st visit to the doctor) were missing on 41% of the birth notifications included in the study. However, in case of several other variables the completeness and reliability was 95-100% (Barry 1989). The author suggested that the best way of ensuring accuracy of information is to publish regular reports, and provide continuous feedback to the producers of data.

The format of the birth notification in Kuwait consists primarily of check boxes, a design that was found to improve the reporting of birth complications in a U.S. study (Frost et al. 1984). The convenient design of the form, however, is not sufficient to ensure completeness of reporting. An urgent need exists for the recognition of the problem, and action leading to remedying the situation. In our view, an ongoing evaluation constitutes a key element of any rational approach to the solution, or at least minimization of the problem.

DEATHS

Items necessary for identification were completely reported on the death notification, as was cause of death. The latter is filled out by the doctor certifying the death. In order to ensure complete reporting of the cause of death, a special effort is made by the Division of Vital and Health Statistics within the Ministry of Public Health. Each notification is checked for completeness, and for establishing a clear cause of death. The concerned doctor is contacted by phone or personal visit in case of missing or unclear information. A recent analysis of the reliability of cause of death reporting in Kuwait showed that deaths due to ischaemic heart disease (IHD) were accurately reported in 81% cases (Verma et al., 1988). The above study was based on a comparison of death certificates and corresponding hospital records. The authors pointed out that the reliability of reporting was high with regard to the broad category of IHD but was not so for sub-categories.

Unlike the cause of death that is completely reported, items on the socioeconomic characteristics of the deceased or his parents are very incompletely recorded. The high level of missing data on the socioeconomic characteristics essentially eliminates the possibility of using the notifications for epidemiological research. One suggestion for increasing the level of reporting about the parent's characteristics is to restrict this information to deaths of children. Persons aged 12 or less are considered as children in Kuwait and are covered by the Maternal and Child health services. Information on parent's characteristics is most meaningful for analyzing infant and child mortality, and should therefore be collected only for this sub-group.

CONCLUSION

Our objective in this study was to assess the completeness and reliability of the contents of birth and death notifications in Kuwait. We found that the birth notification is much more completely filled than the death notification. Also, data are more completely recorded in the private hospitals than government hospitals. On the birth notification, items that require improved recording deal with medical and pregnancy complications, length of gestation, and prenatal visits. On the death notification, socioeconomic characteristics of the deceased and his/her parents are very poorly reported. Finally, a comparison of selected items on the birth notification with the responses in a survey of mothers showed that a reasonable level of consistency is present between the notification data and the mother's response.

Only a mixed conclusion can be drawn about the usability of the birth notification forms for research purposes on the basis of the above analysis. The high degree of reliability of the forms is a heartening finding. However, the very high level of non-reporting for the items on the medical aspects of births, and items on the socioeconomic characteristics of the deceased reduces the utility of the notifications to a considerable extent. There is an urgent need for remedying the above situation.

Two specific recommendations may be offered. First, the concerned authorities should ensure that the already existing internal labor room form that is filled out for each birth is used by the notification clerks to fill out the notification form sections on medical complications. Furthermore, the notification clerk should check the information provided by the person (usually the husband) against the information provided in the ward by the wife. Such a reliability check is especially needed for items dealing with the pregnancy history, such as abortions and child deaths. An essential step in accomplishing the above procedural improvements is the identification of performance deficiencies and adequate retraining of the notification clerks. Second, socio-demographic data on the mother and father of the deceased should be collected only for children aged 12 years or less in order to reduce the burden on the clerks. This change should minimize the very high level of missing data for these items.

In the overall effort to increase the completeness and reliability of birth and death notifications, an ongoing review, editing and evaluation of the forms is a necessary ingredient. Such actions must be instituted without delay to control and improve quality and, thereby, increase the usefulness of these records.

Table 1: Percentage of missing information on various items in the vital statistics published reports, 1975-1988

<u>Vital event and item of information</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1988</u>
<u>Live births</u>				
Place of residence	0.06	0.06	0.6	0.1
Age of mother	0.8	1.0	2.3	4.0
Age of father	1.2	1.4	6.1	3.0
Education of mother	4.4	14.4	10.0	14.9
Education of father	5.1	18.1	13.7	12.6
Birth order	NA	6.2	4.2	5.3
Duration of current marriage	NA	6.4	4.1	5.0
<u>Deaths (total)</u>				
Place of residence	0.04	NA	24.2	20.1
Age	0.8	0.7	0.8	1.4
Education status	NA	22.8	39.5	56.1
Marital status	NA	27.4	37.7	43.0
Occupation	NA	11.7	13.6	45.8
Place of death	NA	NA	13.4	3.7
<u>Infant deaths</u>				
Place of residence	NA	NA	15.9	17.2
Place of death	NA	NA	3.6	5.2
<u>Foetal deaths</u>				
Place of residence	0.3	1.3	5.8	3.9
Place of death	NA	1.1	0.5	0.2
Length of gestation	54.3	33.6	8.0	27.4
Age of mother	NA	38.5	17.0	21.0
Birth order	NA	52.5	45.7	45.6

NA - Not available

Table 2: Items that are 91 to more than 99% complete on the birth, death, and foetal death notifications

<u>% Complete</u>	<u>Item</u>	<u>N</u>
	<u>Birth Notification</u>	<u>38</u>
> 99	Sex, nationality (mother & father), birth place, # twins, twins serial, attendant, district, religion (mother & father), birth outside Kuwait, mother's job	12
95-99	Father's job, father's age, mother's age, current marriage duration, first marriage duration, premature deliveries, # previous pregnancies, # child deaths, #living children, # stillbirths, # abortions	11
91-94	Birthweight, birth length	2
< 91	(see Table 3)	13
	<u>Death Notification</u>	<u>24</u>
> 99	Cause of death (4 items), date of death, nationality, sex, foreign country death	8
95-99	Religion, place of death, age at death	3
91-94	--	0
< 91	(see Table 4)	13
	<u>Foetal Death Notification</u>	<u>26</u>
> 99	Cause of death (4 items)	4
95-99	Nationality (mother & father), religion (mother & father), district	5
91-94	Father's occupation	1
< 91	(see Table 5)	16

Table 3: Percentage of missing information on various items of the birth notification, 1988 (including those items where 10% or more information is missing in the total)

Item	Government hospitals	Private hospitals	MCH centers	Total
Father's education	15.3	5.4	3.3	12.6
Mother's education	18.0	6.3	5.8	14.9
Place of residence	11.2	14.7	16.2	12.2
Delivery induced or spontaneous	43.2	12.0	13.4	35.9
Delivery method	38.2	7.2	21.4	32.0
Complications during delivery	48.9	7.0	16.0	39.5
Congenital malformations	16.3	6.2	9.0	14.6
Malformation description	18.5	9.3	11.9	17.0
Weeks of gestation	28.7	11.0	18.3	25.4
Last delivery date	12.3	11.3	9.9	12.5
Number of prenatal visits	56.5	19.3	50.0	49.9
Medical complications	43.1	7.0	17.2	35.3
Pregnancy complications	44.0	7.2	17.5	36.0
Percentage of births	75.4	17.8	6.8	100.0
Number of births	39,573	9,352	3,550	52,275

* Excludes 605 births that occurred at home or another place.

Table 4: Percentage of missing information on various items of the Birth notification for government hospitals, 1988 (including only those items where 10% or more information is missing in the total)

Item	Maternity Hosp.	Farwaniya Hosp.	Adan Hosp.	Jahra Hosp.	Total Gov. Hosp.
Father's education	4.1	7.3	1.6	61.2	15.3
Mother's education	6.1	8.5	2.8	68.1	18.0
Place of residence	13.3	6.5	20.6	3.9	11.2
Delivery induced?	69.8	1.3	26.2	51.5	43.2
Delivery method	64.1	1.4	21.1	42.1	38.2
Complications during delivery	78.7	2.1	39.1	49.7	48.9
Congenital malformations	24.4	1.2	11.6	21.3	16.3
Malformations description	26.8	3.0	15.3	22.2	18.5
Weeks of gestation	39.3	2.4	27.4	38.7	28.7
Last delivery date	7.3	5.1	15.3	28.8	12.3
Number of prenatal visits	86.0	11.0	34.3	67.6	56.6
Medical complications	73.1	2.2	18.5	49.5	43.1
Pregnancy complications	73.8	3.6	20.5	49.5	44.0
Percentage of births	41.0	22.8	17.1	19.1	100.0

Table 5: Percent of missing data on various items of the death notification, 1988 (selecting only those items where 10% or more information is missing in the total)

Item	Place of death			Total
	Government hospitals	Private hospital	Other places	
Time of death	0.8	2.3	66.0	23.6
Hour of death	1.5	1.6	65.0	23.7
District of residence	10.6	1.6	38.0	19.9
Block no. of residence	29.9	23.4	52.7	37.7
Profession of deceased	39.9	9.4	59.3	45.8
Marital status deceased	35.8	17.2	58.0	43.0
Education of deceased	54.7	25.8	61.2	56.1
Age of father	94.2	67.2	95.9	94.0
Education of father	88.6	64.1	90.8	88.7
Occupation of father	88.6	64.1	90.8	88.7
Age of mother	92.4	67.2	96.2	93.1
Education of mother	89.0	64.1	91.1	89.0
Occupation of mother	89.0	64.1	91.1	89.0
Number of deaths	2,860	128	1,599	4,586
Percent of deaths	62.4	2.8	34.8	100.0

Table 6: Percentage of missing information on various items of the stillbirth notification, 1988 (including those items where 10% or more information is missing in the total)

Item	Government hospitals	Private hospitals	MCH Centers	Total
Age of father	25.0	13.0	0.0	22.7
Father's education	62.5	16.9	0.0	54.2
Mother's work status	16.8	2.6	0.0	14.2
Mother's age	20.5	15.6	0.0	19.4
Mother's education	68.0	19.5	0.0	59.2
Cause of death	42.3	11.7	50.0	37.5
Time of death	40.3	15.6	37.5	36.3
Attendant at birth	18.5	0.0	0.0	15.3
Fertility	53.0	26.0	0.0	47.8
Weeks of gestation	30.8	18.2	0.0	28.2
Number of prenatal visits	77.8	20.3	50.0	71.3
Medical complications	61.0	33.8	25.0	56.1
Pregnancy complications	62.5	35.1	62.5	58.1
Delivery induced?	59.3	36.4	62.5	55.7
Delivery method	54.5	29.9	12.5	49.9
Complication during delivery	60.5	35.1	12.5	55.7
Number of stillbirths	400	77	8	485

Table 7: Reliability (consistency) of selected items of the birth notification in comparison with the mother's survey

Item	Percentage of:		(N) #	Kappa value
	Consistent responses	Inconsistent responses		
Age of mother	81.5	18.5	81	.759**
Work status of mother	90.2	9.8	82	.716**
Education of mother	60.9	39.1	64	.523**
Education of father	67.2	15.6	64	.566**
No. of stillbirths	95.7	4.3	69	.378*
Birth weight of alive baby	80.5	19.5	41	.695**
Prenatal visits	55.6	44.4	27	.340*
Total live born children	73.2	26.8	71	.694**
Live born now dead	64.7	35.3	68	***
No. of abortions	75.0	25.0	68	***

Includes only those cases where information was available in both sources. The total number of cases was 83.

* Significant at $p < .05$

** Significant at $p < .001$

*** Significantly consistent at $p < .01$ using Z test for proportions.

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